

65. The process of claim 64, wherein said film is used as a membrane, sensor catalyst, low dielectric constant interlayer, or optical coating.

66. The process of claim 64, wherein said metal oxide is an oxide of silicon, aluminum, or combinations thereof.

67. The process of claim 64, wherein the sol is aged prior to film deposition to affect a change in the film microstructure.

68. The process of claim 64, wherein the sol is aged between 0 to approximately 4 hours prior to film deposition.

69. The process of claim 64, wherein the surfactant includes a cationic surfactant.

70. The process of claim 64 further comprising the step of calcining said film at approximately 400°C.

71. The process of claim 64, wherein the precursor sol is deposited on a substrate by spin coating.--

REMARKS

Claims 28-62 are pending, and a new claim 63 is added hereby. Claims 1-27 are allowed. Claims 28-62 are rejected. Claims 28-31 are rejected under 35 USC § 251 as being an improper recapture of claimed subject matter deliberately canceled in the application for the patent upon which the present reissue is based. Claims 32-62 are rejected under 35 USC § 251 and 35 USC 112 first paragraph. The Examiner states that the specification as originally filed "would not appear to provide support for the invention as is now claimed." The Examiner also states that upon applicants' showing of sufficient support, "it is expected that this new matter rejection will be withdrawn." Claims 32-62 are rejected under 35 USC § 112, ¶ 2, as failing to set forth the subject matter which application(s) regard as their invention.


Improper Presentation of Product Claims in Re-Issue Application

The Examiner relies on *Ball Corp. v. United States*, 221 USPQ 289 (Fed. Cir. 1984) and *In re Orita*, 193 USPQ 145 (CCPA 1977) and 35 U.S.C. § 251. The Examiner's rejection is respectfully traversed.

First, applicants note that in *Ball*, the Federal Circuit held that even deliberate cancellation of a claim to which applicant is entitled may be correctable error--i.e. it is not barred by the recapture rule--where there is "no deceptive intent." *Ball Corp.*, 221 USPQ at 294. Accordingly, the reissue patent of *Ball* was upheld as being valid and enforceable. *Id.*

at 297. The Federal Circuit panel in *Ball* reiterated its reliance on the CCPA's broad construction of the 35 U.S.C. § 251 term "error" ("[E]rror is sufficient where the deliberate cancellation of claims does not amount to an admission that the reissue claims were not patentable at the time the original claims were cancelled."). *Ball Corp.*, 221 USPQ at 294, citing *In re Petrow*, 159 USPQ 449, 451 (CCPA 1968). The Federal Circuit explicitly rejected a strict interpretation of error in favor of *Petrow*'s "more liberal approach." *Id.*

Grounded in public policy, the rule against recapture prevents an applicant from re-prosecuting or regaining a claim—or claim element—that was deliberately canceled in order to overcome a reference or in acquiescence of the unpatentability of the surrendered subject matter. In seeking to label applicant's actions as surrender so readily in the present reissue application, however, the examiner paints with too broad a brush. The patent reissue statute reads, in relevant part:



Whenever any patent is, through error without any deceptive intention, deemed wholly or partly inoperative or invalid, by reason of a defective specification or drawing, or by reason of the patentee claiming more or less than he had a right to claim in the patent, the Director shall, on the surrender of such patent and the payment of the fee required by law, reissue the patent for the invention disclosed in the original patent, and in accordance with a new and amended application, for the unexpired part of the term of the original patent. No new matter shall be introduced into the application for reissue. . . .

35 U.S.C. 251 (emphasis added).

The test to determine applicability of the rule against recapture is clearly articulated in *In re Clement*, 45 USPQ 2d 1161, 1165 (Fed. Cir. 1997). The Federal Circuit expressly limited the *Ball Corp.* holding to its particular facts, *id.* at 1166. *Clement* sets forth the following three-step process for applying the rule against recapture:

- (1) "determine whether and in what 'aspect' the reissue claims are broader than the patent claims;"
- (2) "determine whether the broader aspects of the reissue claims relate to surrendered subject matter;" and
- (3) if so, "determine whether the surrendered subject matter crept into the reissue claims."

Id. at 1164.

The first step, then, is to examine the reissue claims in question to determine whether and in what aspect they might be broader than the patent claims. Under this test, reissue claim 30 is not subject to the rule against recapture, since it is narrower in all aspects than the corresponding cancelled claim 27. See *Clement*, 45 USPQ 2d at 1165. Additionally, reissue

claim 31 does not invoke the rule against recapture because the added and omitted limitations are not responsive to any prior art rejection or even suggestion of the same. The scope of claim 30 is narrower than that of corresponding cancelled claim 27 by the addition of a product-by-process limitation "whereby the mesoporous silica product is formed by a process including dry spinning or fiber drawing and evaporation." The scope of claim 31 is narrower than that of corresponding cancelled claim 28 by the addition of the product-by-process limitation "formed by a process comprising dispensing a surfactant-containing precursor solution on the substrate; forming a film on the substrate by rapid evaporation of the precursor solution on the substrate; and heating the film on the substrate to a temperature sufficient to decompose the surfactant", despite its omission of cancelled claim 28's d-spacing limitation. Furthermore, claim 31 is now a product-by-process claim wherein the process limitation closely relates to the pending process claims.

Indeed, the Examiner in the parent application (the same Examiner as in the present reissue examination) stated in his restriction requirement that original Group III's claim 28 (from which reissue claim 31 derives) was patentably distinct from the process claims of Group I because the claimed film on a substrate could be made by distinct processes and because the claimed process could produce distinct products, *citing certain prior art of record in support of the latter having nothing to do with the formation of mesoporous films*. That point is rendered moot by applicants' addition to claim 31 of a process limitation that places the film on a substrate in the same patent class as Group I's claimed film-on-a-substrate-forming processes.

Claims 30 and 31 could appropriately have been added in the prosecution of elected Group I claims of the parent application. The claims neither add new matter nor seek to recapture subject matter omitted (with or without traverse) from the parent application. Thus, there should be no recapture problem, since applicants seek only to claim the subject matter of their invention that they inadvertently and without fraudulent intent failed to obtain previously. Applicant therefore respectfully requests withdrawal by the Examiner of the rejections as to claims 30 and 31.

The second step in applying the rule against recapture is to determine whether the broader aspects of the reissue claims relate to surrendered subject matter. To identify a surrender, the Federal Circuit, in several opinions, has indicated that the prosecution history should be examined for evidence of an admission by the applicant regarding patentability. *See Hester Industries v. Stein*, 46 USPQ 2d 1641, 1648 (Fed. Cir. 1998); *Clement*, 45 USPQ 2d at 1164; *Mentor Corp. v. Coloplast*, 27 USPQ 2d 1521, 1524 (Fed. Cir. 1993); *Seattle Box*

Company, Inc. v. Industrial Crating & Packing, Inc., 221 USPQ 568, 574 (Fed. Cir. 1984). In addition, *Clement* promotes review of the prosecution history to determine what was surrendered in the interest of patentability. For these reasons, it is helpful in deciding this question to note the parallel between prosecution history estoppel and the rule against recapture.

Similar to the rule against recapture, prosecution history (or file wrapper) estoppel works to prevent a patentee from regaining subject matter surrendered during prosecution in support of patentability.” *Hester*, 46 USPQ 2d at 1647, citing to *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 117 S.Ct. 1040, 41 USPQ 2d 1865 (1997).

Plaintiff in *Hester* made assertions to both the examiner and the Board of Patent Appeals and Interferences (BPAI) that two limitations were of critical importance. Plaintiff subsequently filed a reissue application, seeking to remove the very limitations he had stridently advocated to distinguish his invention over prior art. Quite obviously, both the trial court and the Federal Circuit found this to be a surrender. In addressing plaintiff’s arguments, the Federal Circuit compared the rule against recapture to file wrapper estoppel, *Hester*, 46 USPQ 2d at 1648-49. The two doctrines were found very similar, with the rule restricting the permissible range of expansion through reissue just as file wrapper estoppel restricts the permissible range of equivalents under the doctrine of equivalents.

Case law strongly militates against a finding of surrender in the present reissue application. In the Bruinsma file history there is no evidence whatsoever that applicants intentionally omitted or abandoned the subject matter of claims 28-31. Indeed, the Bruinsma file history is replete with evidence contradicting the notion that applicants intentionally omitted or abandoned the restricted claims. Applicants not only traversed the restriction requirement but also argued vigorously with the Examiner over the restriction.

First, the Examiner articulated a two-way, three-group restriction in an Office action mailed February 20, 1998. Applicants elected Group I including originally presented claims 1 through 24 "with traverse" and spirited argument in their response mailed March 12, 1998. The Examiner continued the restriction requirement in an Office action mailed April 23, 1998 and apparently withdrawn in favor of a Final Office action mailed June 17, 1998. The Final Office action indicated the allowability of the pending elected claims and requested applicants to cancel the remaining non-elected claims. Applicants complied with the request in their response mailed October 8, 1998, wherein originally presented claims 25-28 were cancelled "to place the above referenced application in condition for allowance."

At no time did applicants concede the restriction requirement. At no time did applicants indicate any intent other than to obtain allowance of the elected claims so that the application would issue as a patent. At no time did applicants admit the unpatentability of non-elected and wholly unexamined claims 25-28.

The examiner cited *In re Orita* for the proposition that failure to timely file a divisional application after a restriction requirement was not error under 35 U.S.C. § 251. Applicant respectfully notes that in *Orita* as well as factually similar cases, plaintiff-applicants acquiesced to the restriction without traverse. In *Orita*, applicant during prosecution of the parent application failed even to traverse the restriction requirement, let alone argue against it, thereby *acquiescing to the restriction*. 193 USPQ at 147. Moreover, the CCPA found no error whatsoever in prosecution of the parent application. *Id.* at 148. In *re Watkinson*, 14 USPQ.2d 1407 (Fed. Cir. 1990), applicant made an election of claims without traverse or argument and failed to file a divisional on the non-elected claims. The Federal Circuit panel said that applicant acquiesced to the restriction, evidencing its intent to abandon the restricted claims. Similarly, applicant in another case, *In re Weiler*, 229 USPQ 673, 674 (Fed. Cir. 1986), attempted to present in the reissue application claims not presented in the original application. The Federal Circuit panel held that, because applicant acquiesced without contest to the restriction, there was no demonstrated error. *Id.* at 674.

Those decisions are readily distinguishable from the present case, in which applicants traversed and argued against the restriction and erred without deceptive intent in appreciating the scope of their invention. Never in a reissue case has a court held that a vigorous debate during prosecution of a parent application over a restriction requirement was evidence of an intent to omit or abandon the restricted claims. This is true despite the fact that no divisional application to the non-elected claims was timely filed, an inadvertence that the Federal Circuit says in both *Ball* and *Seattle Box* is correctable error. Thus, these two Federal Circuit decisions control the Examiner's determination in the present reissue application in the face of ample evidence that it was not applicants' intent to omit, abandon or surrender the subject matter of the non-elected claims.

The *Hester* court also noted that, as an alternative to express surrenders of subject matter, an applicant could surrender subject matter through argument, *i.e.*, "unmistakable assertions." *Id.* at 1649. Non-express surrender by argument is also not evidenced in the present matter, where applicants vigorously debated the correctness of the Examiner's restriction requirement and cancelled the non-elected claims only when such was required by the Examiner to avoid abandonment of allowed claims. *Clement* states that even a deliberate

cancellation or amendment of a claim, in the absence of a stated surrender by applicant, is strongly suggestive but not dispositive of an admission of nonpatentability. 45 USPQ 2d at 1164. *Seattle Box* is a typical example of a proper application of the rule against recapture applied to prevent a patentee from regaining subject matter surrendered for patentability reasons. *Seattle Box*, during prosecution of its parent application, placed in claim 1 a limitation as to the height of spacers in a pipe bundling method. The limitation was not added to overcome a §102 or §103 rejection; rather, it “‘arose through inadvertence by counsel.’” The limitation was removed in the reissue claim, making it broader than the issued parent claim 1 but not broader than the initially-submitted parent claim 1. The court concisely stated that the rule against recapture was inapplicable “because there [was] no evidence that *Seattle Box*’s amendment of its originally filed claims was in any sense *an admission that the scope of that claim was not in fact patentable*” (emphasis added), citing to both *Ball Corp.* and *In re Petrow*. Applicants’ error in this case--inadvertently failing to file a divisional application--is precisely the kind of error under *Ball* and *Seattle Box* that 35 U.S.C. § 251 expressly provides for correction by reissue.

Thus, the only reissue claims subject to the rule against recapture are those reissue claims—namely, claims 28 and 29—of identical scope to claims in the parent application. But as argued above, in the present case, the recapture rule does not bar presentation and examination of these claims for several reasons: their unpatentability was never conceded by applicants, applicants never intentionally or deliberately abandoned them, and the reissue claims at issue are narrower in scope than the claims of the parent application. Consideration of claims 28-31 need not treat the four claims as standing or falling together in the present reissue application. For example, claim 30 drawn to a product by the process closely related to the other process claims in the reissue application is properly presented in the reissue application in consideration of applicants’ uninformed and mistaken belief that the claim could not be amended in such a manner as to more closely and less distinctly relate it to the other process claims. Similarly, claim 31 drawn to a product by the process closely related to the other process claims of the reissue application is properly presented in the reissue application in consideration of applicants’ uninformed and mistaken belief that the claim could not be amended in such a manner as to more closely and less distinctly relate to the other process claims. *Moreover, applicants note that claim 31 is drawn to a calcined mesoporous silica film, which is the very same product that is recited as being formed by the remaining process claims of the reissue application.*

For all of the reasons stated above, the rule against recapture does not bar presentation, examination and allowance of reissue claims 28-31 corresponding to original claims 25-28 cancelled by applicant as required by restriction and not made subject of a divisional application, by inadvertence and without fraudulent intent. Applicant respectfully requests withdrawal by the Examiner of the rejections.

New Matter

No new matter is added, all new claims being supported by the originally filed specification, including the drawings and the originally filed claims, as will be seen.

Applicants expect the Examiner to withdraw his rejection of claims 28-31 based upon their arguments set forth above. Accordingly, applicants submit that support for claims 28-31 may be found in the Bruinsma, et al. patent as follows.

Claim 28 finds support in Example 3 and Example 7 at column 11, lines 39-52 and column 16, lines 15-33, respectively, regarding mesoporous silica powder particles, their mesopore-containing hollow-sphere morphology and size.

Claim 29 finds support in Example 3 and Example 7 at column 11, lines 39-44 and column 16, lines 18-23, respectively, regarding particle size ranges.

Amended claim 30 finds support in Example 4 (fiber drawing) and Example 6 (dry spinning) at column 12, lines 20-50 and column 13, lines 11-14, and at column 14, line 44-column 15, line 46, respectively, regarding mesoporous fibers of given diameter. Amended claim 30 also finds support at column 12, lines 26-29, column 14, lines 32-34 and column 15, lines 1-8 regarding rapid evaporation.

Amended claim 31 finds support in Example 1 and Example 10. Example 1 is described in detail at column 8, line 40-column 9, line 11. Example 10 is described in detail at column 18, lines 13-63.

New claims 32-39 copied from the Brinker, et al. patent are supported by reissue applicant's original disclosure as follows:

no way - new matter Claim 32 finds support at column 8, line 43-column 9, line 47; column 9, line 56-column 10, line 2; column 18, lines 1-61; and Figs. 1-5 and 20-21. Examples 1 and 10 describe a method of making a film, before and after calcination, the film exhibiting ordered porosity by way of X-ray diffraction (XRD) peaks. The solution mixtures used for deposition in Examples 1 and 10 do not have micelles. Accordingly, some explanation is helpful here.

In simple aqueous solutions that do not contain alcohol, micelles form when the surfactant concentration exceeds a critical micelle concentration (CMC). However, the use

of large amounts of alcohol, as in disclosed Examples 1 and 10 simply prevents the formation of micelles. With substantial amounts of alcohol in such a deposition solution, micelles (essentially agglomerates of surfactant molecules) do not exist in solution. Thus, although it is not expressly stated, those of skill in the art would readily appreciate that the disclosed solutions were below any "critical micelle concentration". So, the solutions described in Examples 1 and 10 support claim 32 part (a).

Part (a) of claim 32 and the deposition part (b) of claim 32 are supported by Example 1 (column 8, line 40-column 9, line 11) and by Example 10 (column 18, lines 1-61). The last portion of part (b) which essentially requires ordered structures by XRD in the uncalcined film is supported by Example 1 (column 9, lines 12-15 and 36-49 and Figs. 1, 2 and 3 associated with Example 1) and Example 10 (column 18, line 66-column 19, line 14 and Figs. 20 and 21 associated with Example 10). Reissue applicants cite many examples of hexagonal pore ordering, which is one of the pore orderings recited in the alternative in claim 32. It would have been straightforward for one of ordinary skill in the art from what was known about phase diagrams of surfactant-solvent systems that a specific change in the solution mixture would produce changes in the pore ordering of the film. The "deposition by evaporation" recitation of part (b) of claim 32 is further supported in the Summary of the Invention at column 3, lines 47-50 and column 4, lines 17-25.

nb Claim 33 finds support at column 2, lines 13-23, with respect to low dielectric constant interlayers, coatings and interlayers in semiconductor devices. The optical refractive index measurement and control in the film as described in Fig. 4 and at column 10, lines 7-12 would have suggested to one of ordinary skill in the art the use of this film in optical coatings, another of the alternative film uses recited in claim 33.

AR Claim 34 finds support at column 7, lines 23-40; column 8, lines 49-54; column 10, lines 38-39; and column 13, line 27-column 14, line 17. Examples 1 and 2 describe the synthesis of silica (silicon dioxide) films. Example 5 described the incorporation of aluminum in the film. Support would also be found in the prior art by which those of skill in the art would have known to substitute other oxides for the disclosed silicon and aluminum oxides.

OK Claims 35-36 find support at column 18, lines 50-55 in Example 10 regarding aging of the solution 1 hour before deposition (by spin coating), which aging is within the recited range.

OK Claim 37 finds support at column 7, lines 41-52 in which the expressly described cationic surfactant is simply "preferred", i.e. non-exclusive. Examples 1, 5 and 10 use a

cationic surfactant in the deposition solution to illustrate the method described and the product obtained by this method. Specifically the surfactant cetyl trimethyl ammonium chloride, CTAC, was used as is mentioned at column 8, lines 52-53, column 13, line 22 and column 18 (Tables E-10a and E-10b).

OK Claim 38 finds support at column 18, lines 59-65. The film in Example 10 was calcined at 450°C as stated at column 18, lines 63-65. Applicants for reissue submit that 450°C is within the recited "approximately 400°C" range.

OK Claim 39 finds support at column 4, lines 35-48; column 6, line 63-column 7, line 1; column 8, line 55-column 9, line 11; column 10, lines 41-58; column 13, lines 29-34; column 18, lines 56-63. The "deposition by spin coating aspect" is supported in the Summary of the Invention at column 3, lines 47-50 and at column 4, lines 17-25. Furthermore, column 8 lines 55-67 and column 18, lines 56-59 in Example 10 also specifically state that the precursor sol (i.e. deposition solution) was deposited by spin coating on a substrate.

New claims 40-71 find support in the original Bruinsma application as follows:

OK Claim 40 finds support in Example 1 and Example 10, up to the point in each example where the films are calcined. Example 1 is described in detail at column 8, line 40-column 9, line 11. Example 10 is described in detail at column 18, lines 13-63.

OK Claim 41 finds support at column 7, lines 58-63; column 9, lines 34-55; and in Fig. 2. The specified range for the mole ratio of the surfactant:silica precursor within the precursor solution is about 0.05 to 0.30 in Example 1, Figure 2, and associated discussion in column 9, lines 34-55 as being the range explored, as well as at column 7, lines 58-63 as being a prospective range for the recited mole ratio.

OK Claim 42 finds support in Example 1 and Example 10, up to the point in each example where the films are calcined. Example 1 is described in detail at column 8, lines 40-67 through column 9, lines 1-11. Example 10 is described in detail at column 18, lines 13-63.

OK Claim 43 finds support at column 3, lines 47-50 and column 4, lines 17-25. The "step of rapid evaporation by spin coating" is supported in the Summary of the Invention at Lines 47-50, Column 3 as well as 17-25, Column 4. Further support may be found at column 8, lines 55-67 (Example 1) and column 19, lines 56-59 (Example 10), which describe in detail the step of rapid evaporation by spin coating on a substrate.

OK Claim 44 finds support at column 9, lines 9-10 and at column 18, lines 63-65. The film in Example 10 was subjected to the "second removing" by calcining at 450°C as mentioned at column 18, lines 63-65. Similarly, the film in Example 1 was subjected to the "second removing" by calcining at 550°C as mentioned at column 9, lines 9-10.

OK Claim 45 finds support at column 4, lines 5-9, where the need for solution mixtures that avoid premature gelation or precipitation is explained.

Claim 46 finds support at column 7, lines 58-63; column 9, lines 34-55; and in Fig. 2.

OK The specified range for the mole ratio of the surfactant:silica precursor within the precursor solution is about 0.05 to 0.30 in Example 1, Figure 2, and associated discussion in column 9, lines 34-55 as being the range explored, as well as at column 7, lines 58-63 as being a prospective range for the recited mole ratio.

OK Claim 47 finds support at column 4, lines 5-9, where the need for solution mixtures that avoid premature gelation or precipitation is explained.

OK Claim 48 finds support for the use of stoichiometric or superstoichiometric amount of water with respect to the silica precursor at column 8, lines 6-11.

OK Claim 49 finds support for the use of tetraethoxysilane in the precursor solution at column 7, lines 24-26, in Example 1 (column 8, lines 49-50) and in Example 10 (Tables E-10a and E-10b both list TEOS (tetraethoxysilane) as a constituent of the precursor solution).

Claim 50 finds support at column 7, lines 58-63; column 9, lines 34-55; and in Fig. 2.

OK The specified range for the mole ratio of the surfactant:silica precursor within the precursor solution is about 0.05 to 0.30 in Example 1, Figure 2, and associated discussion in column 9, lines 34-55 as being the range explored, as well as at column 7, lines 58-63 as being a prospective range for the recited mole ratio.

OK Claim 51 finds support at column 3, lines 47-50 and column 4, lines 17-25. The "step of rapid evaporation by spin coating" is supported in the Summary of the Invention at Lines 47-50, Column 3 as well as 17-25, Column 4. Further support may be found at column 8, lines 55-67 (Example 1) and column 19, lines 56-59 (Example 10), which describe in detail the step of rapid evaporation by spin coating on a substrate.

NEW MATTER Claim 52 finds support in Example 1 and at Fig. 4. Mesoporous films with refractive indexes less than 1.25 were demonstrated in Example 1, Fig. 4, where refractive index values of less than 1.25 were exhibited by calcined films that were prepared with surfactant/silica mole ratios of about 0.12-0.25.

new matter Claim 53 finds support at column 10, lines 3-11, Example 1 and at Fig. 4. The description at column 10, lines 3-11 indicate that films with refractive index values "down to about 1.16" were obtained on a calcined film prepared with a surfactant:silica mole ratio of about 0.25. "down to 1.16" does not give explicit support for less than 1.16. new matter.

Claim 54 support is inferred from the refractive index range down to about 1.25 of claim 52, and from the fact that those of skill in the art would have known that a refractive

index of 1.25 indicates a high film porosity that would correspond to a dielectric constant of less than approximately 3.0.

Claim 55 finds support at column 8, lines 43-48; column 10, lines 36-37 and column 13, lines 20-21 respectively describing Examples 1; 2; and 5, all of which involved the use of silicon substrates (e.g. wafers). Support for low-k dielectric mesoporous films is found at column 10, lines 10-11 by the fact that those of skill in the art would have known that a refractive index of 1.16 indicates a high film porosity that would correspond to a low-k dielectric constant, e.g. of less than approximately 2.5.

Claim 56 finds support in Examples 1 and Example 10, which describe this method for preparing a film from surfactant-containing silica precursor solution. This claim is identical to claim 1 except there is no restriction on type of surfactant. This claim finds further support at column 7, lines 41-52 in which the cationic surfactant, CTAC, used in the illustrative examples is simply "preferred", i.e. non-exclusive, and therefore the patentable invention is not limited to the types of surfactants that can be used.

Claim 57 finds support also from Examples 1 and Example 10, which describe this method for preparing a film from surfactant-containing silica precursor solution. Without calcination, support comes from the method of forming films described relative to Example 1 at column 8, lines 40-67 through column 9, lines 1-8, as well as the method relative to Example 10 at column 18, lines 1-62.

Claim 58 part (a) and part (b) are supported by the process described relative to Example 1 (column 8, line 40-column 9, line 8) and Example 10 (column 18, lines 1-61).

Claim 59 finds support at column 4, lines 5-9, where the need for solution mixtures that avoid premature gelation or precipitation is explained.

Claim 60 finds support at column 7, lines 58-63; column 9, lines 34-55; and in Fig. 2. The specified range for the mole ratio of the surfactant:silica precursor within the precursor solution is about 0.05 to 0.30 in Example 1, Fig. 2, and associated discussion in column 9, lines 34-55 as being the range explored, as well as at column 7, lines 58-63 as being a prospective range for the recited mold ratio.

Claim 61 finds support at column 4, lines 5-9, where the need for solution mixtures that avoid premature gelation or precipitation is explained.

Claim 62 finds support for the use of stoichiometric or superstoichiometric amount of water with respect to the silica precursor can be found at column 8, lines 6-11. Support for this claim in terms of the working with a precursor that does not gel or precipitate can be

found at column 4, lines 5-9, where the need for solution mixtures that avoid premature gelation or precipitation is explained.

New claim 63 support is inferred from the refractive index range down to about 1.16 of claim 53, and from the fact that those of skill in the art would have known that a refractive index of 1.16 indicates a high film porosity that would correspond to a dielectric constant of less than approximately 2.5.

New claim 64 is identical to claim 32--and is copied from the Brinker, et al. patent--but omits the surfactant concentration limitation of part (a). Thus, support for Brinker-dominant claim 64 is as discussed above in support of claim 32.

New claims 65-71 are identical to claims 33-39 (except for their dependency)--and are copied from the Brinker, et al. patent. Thus, support for these dependent Brinker-dominant claims is as discussed above in support of claims 33-39.

Rejections under 35 USC § 112 ¶ 2

Applicants hereby voluntarily amend unobjected-to claim 49, in order to make it read more clearly. No new matter is added.

The Examiner objects that claims 32 and 58 (a) contain the indefinite and relative "surfactant concentration is much less than the critical micelle concentration" phrase, and requests numerical limits on how much is much less and how much is critical. As is pointed out above, the solution mixtures of applicants' Examples 1 and 10 do not have micelles. Those of ordinary skill know that micelles form when the surfactant concentration exceeds a critical micelle concentration (CMC) that is specific to the surfactant's particular composition. When large amounts of alcohol are used, as in Examples 1 and 10, the formation of micelles is effectively prevented. This is because micelles, which essentially are agglomerates of surfactant molecules, do not exist *in solution*. It is loss of solvent (dominated in Examples 1 and 10 by loss of alcohol more than by evaporation of water) which leads to formation of micellar structures in the rapidly drying (rapid evaporation, e.g. via spin-coating) film. And the point where alcohol evaporation leaves a water-rich solution and micelles begin to form cannot be defined within the few seconds of spin-coating when the solution is rapidly dried to form the film (ultimately producing a mesostructured two-phase film). Accordingly, applicants request that the Examiner withdraw the objection.

The Examiner objects to the omitted degree symbol (°) in claim 38. Applicants hereby amend claim 38 to add the inadvertently omitted degree symbol.

The Examiner objects to claim 40 as being indefinite because it allows "any one or more of the steps including spin coating, rapid evaporation, and calcination." The Examiner asks what specific steps are needed to achieve mesoporous film for each such method step. Applicants hereby amend claim 40 to more definitely claim the subject matter of the invention. Specifically, original steps b and c are replaced with modified steps b, c and d, which recite "(b) dispensing said precursor solution on the substrate; (c) forming a film by rapid evaporation of the solution on the substrate; and (d) heating the film on the substrate to a temperature sufficient to decompose the surfactant, thereby producing a mesoporous film on the substrate. No new matter is added, the replacement steps finding support in Examples 1, 2 and 5 at column 8, line 55-column 9, line 11; column 10, lines 11-12; (heating to 105°C; heating to 450°C; calcining at 550°C); column 10, line 43-47 (heating to 105°C; no calcining); and column 13, lines 29-34 (same dispensing, forming and heating as in Example 1).

Thus, amended claim 40 distinctly points out the precursor solution-dispensing; the film-forming by rapid evaporation, e.g. by spin-coating; and surfactant decomposition (pyrolyzing, oxidizing), e.g. by heating, steps that produce a mesoporous film in keeping with the reissue application's varied experimental results. Applicants respectfully request that the Examiner withdraw the objection.

The Examiner objects to the terms "upper mole ratio" and "lower mole ratio" in claims 41, 46, 50 and 60 as being indefinite. The Examiner encourages applicants to consider numerical ranges in their response. Applicants respectfully submit that the language is definite and that no numerical limitations are needed, for the following reasons.

First of all, the very same limitation regarding "above a lower mole ratio that produces a non-mesoporous silica phase and below an upper mole ratio that produces a lamellar phase" appears in allowed claim 1. Accordingly, claims 41, 46, 50 and 60 should be accorded the same clear interpretation of the above phrase.

The language used in allowed claim 1 and objected-to claims 41, 46, 50 and 60 brackets the surfactant:silica precursor mole ratio not in numerical terms but instead in terms of two distinctive and well-defined solution phases understood by those of skill in the art. Moreover, applicants should not be required to include numerical ranges, as such would be unnecessarily limiting because different surfactant systems have different phase boundaries, as is known. Applicants request that the objections be withdrawn.

The Examiner objects to the term "low k" as indefinite, and suggests that applicant supply a numerical range in their response. Applicants point out that "low k" dielectric is a

term of art well understood by those of ordinary skill in the semiconductor art and that, as such, claims reciting "low k" dielectric are definite. Nevertheless, in claim 54 the "low-k" expression is deleted by amendment. In claim 55, applicants hereby add a further limitation to specify the low-k dielectric characteristic of the mesoporous film as being less than approximately 2.5. Applicants respectfully request that the objection be withdrawn.

The Examiner objects to the misspelling of "ratio" as "ration" in claim 56 part (d). Applicant hereby amends the claim to correct the spelling.

Finally, the Examiner objects to claim 57's final diluting-with-alcohol step. The Examiner asks how much dilution occurs, i.e. what amounts and what concentration. The Examiner suggests that applicant supply these parameters in their response. Applicants submit that "diluting with an alcohol" is definite and understandable to one of ordinary skill in the art. The ordinarily skilled would know that diluting step occurs until the requisite "forming" is achieved, wherein the forming as expressly and definitely recited is of a silica precursor into a preform. Applicants should not be required to limit their claims to particular diluting ratios or concentrations or other unnecessary numerical ranges, so long as the "diluting" with alcohol is understood to produce the "forming" of a preform by the silica precursor solution. Applicants respectfully request withdrawal by the Examiner of the objection.

Surrender of Original Patent and Conclusion

Applicants hereby surrender U.S. Patent No. 5,922,299 to Bruinsma, et al.

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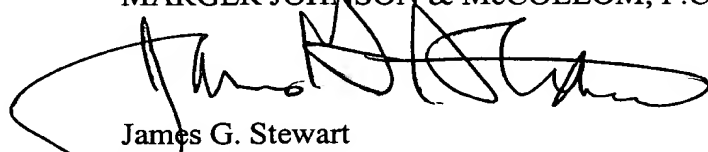
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Applicants note that the Examiner has made no prior art rejection of the pending reissue claims. For the foregoing reasons, applicant solicits reconsideration and allowance of all pending claims including rejected claims 28-62 of the application, as amended, and claim 63 as added hereby. Applicants also respectfully request that an interference be declared with the Brinker patent at the earliest possible time. The Examiner is encouraged to telephone the undersigned at (503) 222-3613 if it appears than an interview would be helpful in advancing the case.

Respectfully submitted,

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I certify that the foregoing is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated below and is addressed to Box FEE AMENDMENT, Assistant Commissioner for Patents, Washington, DC 20231.

Date: July 13, 2000
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Heather Kulin